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Controlling lipid oxidation in skin care products with seaweed based antioxidants

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Studies have shown that brown macroalgae contain a wide range of bioactive compounds. Hence, brown algae have great potential as a resource for development of new natural antioxidants, which can be used to increase the oxidative stability of lipid rich products. In skin care emulsions such as facial cream, unsaturated lipids, e.g. oleic and linoleic acid, play a role in skin strengthening and water holding capacity. However, these lipids are prone to oxidation, which results in lost functionality, development of undesirable off-odors and oxidative stress of the skin.

Our ongoing work aims to extract highly antioxidative compounds from brown alga such as *Fucus vesiculosus*, and investigate possible applications of these extracts in skin care emulsions (facial cream). In this study, two types of extracts (water and 80% (v/v) ethanol) from Danish *F. vesiculosus* were produced. The antioxidant compounds, e.g. mono- and polyphenolic compounds, flavonoids, and fucoxanthins, were characterized and the *in vitro* antioxidant properties determined. The extracts were also added to facial cream and the oxidative stability was followed during a storage period of 8 weeks at 20°C. Furthermore, to evaluate the potential of a new approach for predicting long-term stability within a month, FeCl₂/H₂O₂ was added as lipid oxidation initiator. The use of ethanol for antioxidant extraction increased the polyphenolic yield significantly from ca. 13.5 to ca. 16.5 g GAE/100g dw ($p < 0.05$) compared to extraction by water. Moreover, both extracts exhibited radical scavenging, metal chelating and reducing power activities. However, the ethanol extract showed higher radical scavenging capacity compared with the water extract ($p < 0.05$), EC₅₀ of 3.7±0.1 and 4.2±0.2 µL/mL, respectively

When the extracts were added to facial cream, both were found to improve the oxidative stability in facial cream and protect functional lipids. However, the colour of the skin care emulsions changed when the seaweed extracts was added and the cream became more red/yellow. Furthermore, the use of FeCl₂/H₂O₂ to accelerate oxidation enabled a fast and correct prediction of the oxidative stability in the facial cream within one month.